

In re Patent Application of
MARINET ET AL.
Serial No. 09/995,258
Filed: NOVEMBER 27, 2001

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In the Claims:

This listing of claims replaces all prior versions
and listing of claims in the application.

Claims 1-16 (Canceled).

17. (Currently amended) A random signal generator
comprising:

an electronic noise source comprising a folded MOS
transistor having a drain-source current with a random
component;

said folded MOS transistor comprising a drain and a
source with a folded channel defined therebetween; and
a circuit for generating a digital signal based upon
the random component.

18. (Currently amended) A random signal generator
according to Claim 17, wherein ~~said folded MOS transistor
comprises a drain and a source with a channel defined
therebetween, with~~ the folded channel ~~[[being]]~~ is S-shaped
and ~~[[having]]~~ has a size that is at a resolution limit based
upon manufacturing technology.

19. (Currently amended) A random signal generator
according to Claim 17, wherein ~~said folded MOS transistor
comprises a drain and a source with a channel defined
therebetween, with~~ the folded channel ~~[[being]]~~ is zigzag-
shaped and ~~[[having]]~~ has a size that is at a resolution limit
based upon manufacturing technology.

20. (Previously presented) A random signal generator
according to Claim 17, further comprising a reference
transistor connected to said folded MOS transistor, said

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reference transistor receiving a gate voltage and a bias current equal to a gate voltage and a bias current applied to said folded MOS transistor for causing the drain-source current therefrom to randomly vary.

21. (Previously presented) A random signal generator according to Claim 17, further comprising a comparison circuit for comparing the randomly varying drain-source current to a detection current.

22. (Previously presented) A random signal generator according to Claim 21, wherein said comparison circuit determines a difference between the randomly varying drain-source current and the detection current; and further comprising an amplifier for amplifying the difference.

23. (Previously presented) A random signal generator according to Claim 17, wherein said circuit comprises a sampling circuit for sampling the digital signal for providing a random digital word.

24. (Previously presented) A random signal generator according to Claim 17, further comprising an integrating circuit for maintaining a gate voltage on said folded MOS transistor within a desired range of values.

25. (Currently amended) A random signal generator circuit comprising:

a plurality of random signal generators, each random signal generator comprising

an electronic noise source comprising a folded MOS transistor having a drain-source current with a random component,

said folded MOS transistor comprising a drain

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and a source with a folded channel defined
therebetween, and

a circuit for generating a digital signal based
upon the random component; and

a logic circuit connected to said plurality of
random signal generators for combining the digital signals for
generating a digital number.

26. (Currently amended) A random signal generator
circuit according to Claim 25, wherein ~~each folded MOS
transistor comprises a drain and a source with a channel
defined therebetween, with the folded channel~~ [[being]] is S-
shaped and [[having]] has a size that is at a resolution limit
based upon manufacturing technology.

27. (Currently amended) A random signal generator
circuit according to Claim 25, wherein ~~each folded MOS
transistor comprises a drain and a source with a channel
defined therebetween, with the folded channel~~ [[being]] is
zigzag-shaped and [[having]] has a size that is at a
resolution limit based upon manufacturing technology.

28. (Previously presented) A random signal generator
circuit according to Claim 25, wherein each random signal
generator further comprises a reference transistor connected
to said folded MOS transistor, said reference transistor
receiving a gate voltage and a bias current equal to a gate
voltage and a bias current applied to said folded MOS
transistor for causing the drain-source current therefrom to
randomly vary.

29. (Previously presented) A random signal generator
circuit according to Claim 25, wherein each random signal
generator further comprises a comparison circuit for comparing

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the randomly varying drain-source current to a detection current.

30. (Previously presented) A random signal generator circuit according to Claim 29, wherein each comparison circuit determines a difference between the randomly varying drain-source current and the detection current; and wherein each random signal generator further comprises an amplifier for amplifying the difference.

31. (Previously presented) A random signal generator circuit according to Claim 25, wherein each circuit comprises a sampling circuit for sampling the digital signal for providing a random digital word; and wherein said logic circuit generates the digital number based upon the random digital word.

32. (Previously presented) A random signal generator circuit according to Claim 25, wherein each random signal generator further comprises an integrating circuit for maintaining a gate voltage on said folded MOS transistor within a desired range.

33. (Previously presented) An integrated circuit comprising:

- a random signal generator circuit for generating a random digital number comprising

- an electronic noise source comprising a folded MOS transistor having a drain-source current with a random component, and

- a logic circuit for generating the random digital number based upon the random component;

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a communications module connected to said random signal generator circuit for transmitting the random digital number to an external terminal; and

a processor connected to said random signal generator circuit for receiving the generated random digital number, and for transforming the generated random digital number based upon an authentication function that uses a secret key;

said processor comparing a result of the authentication function to a result of an authentication function provided by the external terminal in response to the random digital number being sent thereto, and authorizing a transaction with the external terminal if the comparison is a match.

34. (Previously presented) An integrated circuit according to Claim 33, wherein the integrated circuit is a portable electronic device.

35. (Previously presented) An integrated circuit according to Claim 34, wherein the portable electronic device comprises a smart card.

36. (Previously presented) An integrated circuit according to Claim 33, wherein said folded MOS transistor comprises a drain and a source with a channel defined therebetween, with the channel being S-shaped and having a size that is that is at a resolution limit based upon manufacturing technology.

37. (Previously presented) An integrated circuit according to Claim 33, wherein said folded MOS transistor comprises a drain and a source with a channel defined therebetween, with the channel being zigzag-shaped and having

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a size that is that is at a resolution limit based upon manufacturing technology.

38. (Previously presented) An integrated circuit according to Claim 33, further comprising a reference transistor connected to said folded MOS transistor, said reference transistor receiving a gate voltage and a bias current equal to a gate voltage and a bias current applied to said folded MOS transistor for causing the drain-source current therefrom to randomly vary.

39. (Previously presented) An integrated circuit according to Claim 33, further comprising a comparison circuit for comparing the randomly varying drain-source current to a detection current.

40. (Previously presented) An integrated circuit according to Claim 39, wherein said comparison circuit determines a difference between the randomly varying drain-source current and the detection current; and further comprising an amplifier for amplifying the difference.

41. (Previously presented) An integrated circuit according to Claim 33, further comprising an integrating circuit for maintaining a gate voltage on said folded MOS transistor within a desired range of values.

42. (Currently amended) A method for generating a random number from an electronic noise source, the method comprising:

providing a folded MOS transistor having a drain-source current with a random component;

the folded MOS transistor comprising a drain and a source with a folded channel defined therebetween;

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generating a random digital signal based upon the random component.

43. (Currently amended) A method according to Claim 42, wherein ~~the folded MOS transistor comprises a drain and a source with a channel defined therebetween, with the folded~~ channel ~~[[being]]~~ is S-shaped and ~~[[having]]~~ has a size that is at a resolution limit based upon manufacturing technology.

44. (Currently amended) A method according to Claim 42, wherein ~~the folded MOS transistor comprises a drain and a source with a channel defined therebetween, with the folded~~ channel ~~[[being]]~~ is zigzag-shaped and ~~[[having]]~~ has a size that is at a resolution limit based upon manufacturing technology.

45. (Previously presented) A method according to Claim 42, further comprising:

providing a reference transistor connected to the folded MOS transistor; and

providing a gate voltage and a bias current to the reference transistor, the gate voltage and the bias current being equal to a gate voltage and a bias current applied to the folded MOS transistor for causing the drain-source current therefrom to randomly vary.

46. (Previously presented) A method according to Claim 42, further comprising comparing the randomly varying drain-source current to a detection current.

47. (Previously presented) A method according to Claim 46, wherein the comparing comprises determining a difference between the randomly varying drain-source current

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and the detection current; and further comprising amplifying the difference.

48. (Previously presented) A method according to Claim 42, wherein the sampling comprises providing a random digital signal based upon the sampled random binary signal, and further comprising generating the random number based upon the random digital signal.

49. (Previously presented) A method according to Claim 42, further comprising maintaining a gate voltage on the folded MOS transistor within a desired range of values.